1   **VISITOR SAFE WIRELESS PRINTER ACCESS POINT**

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7 TECHNICAL FIELD

8   Embodiments of the present invention relate generally

9 to network printing technology, and more particularly to a

10 visitor safe wireless printer access point.

11

12 BACKGROUND

13   The issue of permitting easy access to network

14 printers for wireless device users, while maintaining

15 internal network security, is a difficult one to solve.

16 Additionally, many network administrators may not even be

17 aware that the technology exists for creating a public

18 print environment within a secure network.

19   Currently, a network administrator would have to

20 perform the following steps to set up a public network

21 printing environment for users of wireless devices: (1)

22 setup a wireless access point for public access; (2) setup

23 a firewall between the access point and the secure network,

24 in order to limit the access of the wireless device users

25 to just the printers and/or print servers; and (3) setup a

1 print server on the public network to serve up the

2 appropriate software/drivers for the available printers.

3 Currently, the wireless device users would have to

4 perform the following steps to print: (1) determine how the

5 wireless user can connect to the wireless network (this

6 step usually involves obtaining the appropriate encryption

7 key and network identification (ID), as well as giving the

8 wireless device user access to more devices in addition to

9 just the printers); (2) switch their current wireless

10 devices to use the wireless network; (3) browse the

11 wireless network to find the available printers, by using

12 the wireless device's current add printer technology; (4)

13 add the available printer; and (5) perform printing by use

14 of the added printer.

15 It is difficult to create a public network printing

16 environment for the wireless device users, in a secure

17 network. Additionally, there is the complex process of

18 setting up a device for printing in a new network.

19 Furthermore, there are major security issues when allowing

20 the wireless device users to print in a secure environment.

21 It is important that the wireless device users are not able

22 to access particular devices in which the users have no

23 authorization to access.

1   Therefore, the current technology is limited in its

2   capabilities and suffers from at least the above

3   constraints or deficiencies.

4

5

1 SUMMARY OF EMBODIMENTS OF THE INVENTION

2   In one embodiment of the invention, a method for

3 providing a visitor safe wireless printer access point,

4 includes: connecting a wireless computing device to a

5 wireless network; checking a packet from the wireless

6 computing device in order to determine if the wireless

7 computing device is attempting to connect to an available

8 printer in a secure wired network; downloading a printer

9 driver and printer driver information to the wireless

10 computing device, and initializing the printer driver;

11 using the wireless computing device to print via the

12 available printer in the secure wired network; and

13 transmitting the print job, split into network packets, to

14 a spooling device, if the packets are allowed packets.

15   The packets are checked by a printer access point

16 device (wireless access point). The wireless security

17 settings are checked to determine if the packets are

18 permitted to be transmitted to the spooling device.

19   In another embodiment, apparatus for providing a

20 visitor safe wireless printer access point, includes: a

21 wireless computing device configured to connect to a

22 wireless network with a printer access point device; a

23 spooling device configured to download a printer driver and

24 a printer driver information to the wireless computing

1 device; and wherein the spooling device is configured to

2 check a packet from the wireless computing device in order

3 to determine if the wireless computing device is attempting

4 to connect to an available printer in a secure wired

5 network, and to transmit the packet to the spooling device

6 if the packet is an allowed packet, so that the wireless

7 computing device can be used to print via the available

8 printer in the secure wired network.

9

10 These and other features of an embodiment of the

11 present invention will be readily apparent to persons of

12 ordinary skill in the art upon reading the entirety of this

13 disclosure, which includes the accompanying drawings and

14 claims.

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16

1 BRIEF DESCRIPTION OF THE DRAWINGS

2   Non-limiting and non-exhaustive embodiments of the

3 present invention are described with reference to the

4 following figures, wherein like reference numerals refer to

5 like parts throughout the various views unless otherwise

6 specified.

7

8   Figure 1 is a block diagram of an apparatus (system)

9 in accordance with an embodiment of the invention.

10   Figure 2 is a flowchart of a method for a visitor safe

11 wireless printer access point, in accordance with an

12 embodiment of the invention.

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14

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In the description herein, numerous specific details are provided, such as examples of components and/or methods, to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that an embodiment of the invention can be practiced without one or more of the specific details, or with other apparatus, systems, methods, components, materials, parts, and/or the like. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of embodiments the invention.

An embodiment of the invention simplifies and condenses the necessary tasks to create a secure, public network printing environment for wireless device users (i.e., mobile users). Embodiments of the invention advantageously allow access to the current installed base of printers on a network, without allowing the mobile user to access the entire network. By use of print spooler technology (network printer technology), wireless access point technology, and firewall technology in a novel and unique manner, an embodiment of the invention provides a wireless printer access point device that permits a mobile

1 user(s) to connect to a wireless network and print to a

2 particular printer(s) in a secure wired network, while not

3 permitting the mobile user to access other devices in the

4 secure wired network. The mobile user can easily connect

5 to the wireless network and is directed to the print

6 spooling device. The print spooling device will then serve

7 the printers that can be used for printing by the mobile

8 user.

9 Additionally, embodiments of the invention permit the

10 wireless device user to print from printers in the secure

11 wired network, while advantageously not requiring any

12 changes to the secure wired network.

13 An embodiment of the invention packages many of the

14 necessary hardware elements for a visitor safe wireless

15 printer access point into one device, and configures the

16 device to make the creation of a public network printing

17 environment for mobile users in a much easier manner. An

18 embodiment of the invention also addresses the major

19 security issues when allowing the mobile users to print in

20 a secure environment and provides a service that eliminates

21 the complex process of setting up a device for printing in

22 a new network.

23

1   Figure 1 is a block diagram of a network system

2 (apparatus) 100 that can implement an embodiment of the

3 invention. In the example network system 100, a mobile

4 user 105 can use a wireless device 110 to access a wireless

5 network 115 and print from one or more printers 120 that

6 are included in a secure wire network 125. As an example,

7 the secure wire network 125 is based upon the Ethernet

8 specification. In the example of Figure 1, the printers

9 are generally referred to as printer(s) 120. The printer

10 120a and printer 120b are examples of particular printers

11 that are included in the secure wire network 125. The

12 number of printers 120 in the secure wired network 125 may

13 vary. The mobile user 105 is typically not authorized to

14 use other devices (such as secure device 135) in the

15 secured wired network 125.

16   The wireless device 110 is a suitable computing device

17 such as, for example, a laptop, notebook computer, palmtop,

18 or other type of suitable portable computer with wireless

19 operation capability. One suitable wireless protocol for

20 the wireless device 110 is, for example, the IEEE 802.11b

21 standard.

22   A printer 120 may be a printing device for generating

23 a printed output 130 from a print job. Alternatively, a

24 printer 120 may be other types of devices, such as a copy

1   machine, fax machine, or digital projector that can

2   generate a printed output 130 from a print job.

3   The secured wired network 125 may also support other

4   devices that have restriction on access. For example, the

5   secured wired network 125 supports a secure computer 135

6   (and/or other secure device) that is not accessible by the

7   mobile user 105 without authorization.

8   Various known components and modules that permit the

9   printer 120 or/and other devices to interface in the secure

10 wired network 125 are not shown in Figure 1 for purposes of

11 describing a functionality of embodiments of the invention.

12 Additionally, various known components and modules that

13 permit the wireless computing device 110 to interface with

14 the wireless network 115 are not shown in Figure 1 for

15 purposes of describing a functionality of embodiments of

16 the invention.

17

18   Assume that the mobile user 105 intends to access one

19 or more of the printers 120 in the secure wired network

20 125, in order to perform a print operation. The mobile

21 user 105 will first permit the connection of the wireless

22 device 110 to the wireless network 115 by use of a suitable

23 protocol such as the IEEE 802.11b standard. It is

24 understood that the wireless device 110 includes standard

1 hardware and software for permitting communication via the

2 wireless network 115. Typically, the mobile user 105 will

3 configure the wireless settings of the wireless device 110

4 to match the visitor settings of the wireless network 115,

5 in order to access the wireless network 115.

6   The PRINT network may be broadly defined as including

7 the spooler device 187 and printer access point device 145.

8 The PRINT network is a public wireless network 115 in the

9 example of Figure 1. The wireless computing device 110 can

10 connect to the public wireless network 115. The public

11 wireless network 115 may be, for example, a public 802.11b

12 network. As one example, PRINT is the SSID setting that is

13 necessary to communicate on the public 802.11b wireless

14 network where encryption is not enabled. However, it is

15 within the scope of embodiments of the invention that other

16 settings (e.g., the string "MYPRINTERS" or other settings)

17 may be used to communicate on a public 802.11b wireless

18 network. Additionally, it is within the scope of

19 embodiments of the invention that the public wireless

20 network 115 may be implemented by use of other suitable

21 types of networking technologies and that the public

22 wireless network 115 is not limited to the IEEE 802.11b

23 standard. Therefore, other settings are typically used to

1   connect to these public wireless networks 115 that

2   implement other networking technologies.

3   By connecting to the PRINT wireless network, a user

4   105 can locate available printers 120, automatically create

5   a way to print to an available printer 120, and then print

6   a job 131 to the printer 120. The actual printer 120 may

7   reside only on the secure wired network 125, and the

8   spooling device 187 may accept a print job 131, spool the

9   job 131, and then print the job 131 to the printer 120 on

10   the wired network 125.

11   The print job 131 is transmitted from the wireless

12   device 110 to the printer access point device (wireless

13   access point) 145. The print job 130 is split into network

14   packets 131a and transmitted to the print spooling device

15   187, if the packets 131a are allowed packets. The packets

16   131a are checked by the printer access point device

17   (wireless access point) 145, prior to the transmission of

18   allowed packets 131a to the print spooling device 187. The

19   standards based wireless security settings 192 are checked

20   by a processor 149 to determine if the packets 131a are

21   permitted to be transmitted to the spooling device 187.

22   Therefore, the wireless access point 145 provides a public

23   access point that allows access to the wireless network 115

1   where only the print spooling device 187 would be

2   available.

3

4   The print spooling device 187 has a wireless

5   connection 116 to the wireless network 115 and a wired

6   connection 126 to the secure wired network 125. The print

7   spooling device 187 is a gateway to the secure wired

8   network 125.

9   The print spooling device 187 also includes a firewall

10 module 165 that performs all firewall activities, as

11 described in additional detail below, so that allowed print

12 job packets 131a are sent to the appropriate printer 120 on

13 the secure wired network 125.

14   The spooling device 187 also includes a printing

15 subsystem 166 that performs the printer setup, print job

16 spooling, downloads of printer drivers 167, and other

17 functions to permit printing operations. The printing

18 subsystem 166 may be, for example, a WINDOWS® print

19 subsystem, a LINUX print subsystem, or other types of

20 printing subsystems.

21   The public print shares 168 establish a print path

22 through the spooling device 187 to the secure wired network

23 printer 120.

1   The processor 146 in the print spooling device 187

2   processes the network packets 131a for transmission to a

3   destination printer 120. The processor 146 can also

4   execute the software programs in the print spooling device

5   187.

6

7   The printer access point device 145 is configured to

8   allow wireless access to only the spooler device 187, which

9   may be contained within the access point, within a given

10   secure network environment 125. To accomplish this

11   functionality, the printer access point device 145 is

12   typically set up to allow public access without encryption

13   to the PRINT network. The printer access point device 145

14   allows access to only the spooler device 187 which by

15   omission it prevents the mobile user 105 to access other

16   devices (e.g., secure computer 135) in the secure wired

17   network 125.

18   The printer access point device 145 implements current

19   wireless access point technology that permits the mobile

20   user 105 to access the PRINT network. In an embodiment,

21   the printer access point device 145 may include a standard

22   access point module (in hardware or/and software) that acts

23   as a communication hub for mobile users 105 of wireless

24   devices 110 to connect to the PRINT wireless network that

1 will allow indirect access to the printers 120 in the

2 secure wired network 125.

3   Upon connection of the wireless device 110 to the

4 PRINT network, a browser software 150 in the wireless

5 device 110 is directed to a print web page that is served

6 by the web server 169. The browser software 150 is

7 typically an HTML (hypertext markup language) browser. The

8 processor 151 in the wireless device 110 can execute the

9 browser 150 and execute other software or firmware in the

10 wireless device 110. The web server 169 in the spooler

11 device 187 may typically serve the print web page to the

12 browser 150. The mobile user 105 is then presented with

13 the print web page on a screen of the wireless device 110,

14 where the print web page lists or shows all available

15 printers 120 in the PRINT network. The mobile user 105

16 could then select one of the available printers 120 in the

17 print web page for printing.

18   As mentioned above, the printer access point device

19 145 allows access to the print spooler device 187. The

20 print spooler device 187 also includes the standard

21 firewall 165 that will disallow direct access by the

22 wireless device 110 to any part of the secure wired network

23 125. The print spooler device 187, which includes the

24 firewall 165, would capture all packets sent from the

15

1 wireless device 110 via the wireless network 115, and then

2 the print spooler device 187 will spool and send the

3 allowed print job packets 131a to the appropriate printer

4 120 on the secure wired network 125. The firewall 165 is

5 typically a code or a set of related programs that protect

6 the resources of the secure wired network 125 from

7 unauthorized users. As known to those skilled in the art,

8 a firewall examines each network packet to determine

9 whether to forward the packet toward its destination.

10 When the wireless device 110 connects with the printer

11 access point device 145, the wireless device 110 will

12 transmit packets (from a print job 131) that are received

13 by the printer access point device 145. The wireless

14 access point device will relay the packets to the spooler

15 device 187, which contains the firewall 165. The firewall

16 165 will examine the destination address (DA) of the

17 packets to determine if the wireless device 110 is

18 attempting to connect to a printer 120 that is permitted to

19 be accessed by the mobile user 105, or if the wireless

20 device 110 is attempting to connect to a restricted

21 resource (e.g., secure device 135 in secure network 125)

22 that is not permitted to be accessed by the mobile user

23 105. If the firewall 165 determines that the destination

24 address of the packets is to one of the printers 120a or

1 120b (or to other available printers 120, then the firewall

2 165 will allow the spooling device 187 to spool the packets

3 as part of the print job being sent by the wireless device

4 110. Once the spooling device 187 receives all print job

5 packets for a single print job 131, it will send the print

6 job to the appropriate printer 120.

7   On the other hand, if the firewall 165 determines that

8 the destination address of the packets is to a restricted

9 resource in the secure wired network 125 (such as secure

10 device 135), then the firewall 165 will prevent the packets

11 from transmitting to the destination address, and may be

12 optionally configured to return to the wireless device 110

13 a message indicating, for example, that the requested

14 access to the resource in the destination address has been

15 denied.

16

17   In another embodiment, a mobile user 105 can connect

18 directly to a printer access point device 145 that uses a

19 wireless security module 192. The wireless security module

20 192 is responsible for all standards based wireless

21 security settings. Once the user has connected to the

22 wireless PRINT network through the access point device 145

23 and has been authenticated and/or encryption methodology

24 has been negotiated, the mobile user 105 can be directed to

1   the print spooling device 187, by launching a browser 150

2   or other suitable software in the mobile wireless device

3   110. The available printers 120 are then shown in the

4   screen of the wireless device 110, after connection to the

5   print spooling device 187.

6

7   After the mobile user 105 initially selects one of the

8   available printers 120, the printer driver information and

9   the printer driver 167 for the initially selected available

10   printer 120 will be downloaded to the wireless device 110

11   via the wireless network 115, and a print path is then

12   created from the mobile wireless device 110 to a spooling

13   device 187, and indirectly to the selected wired printer

14   120. This step is applicable to all embodiments of the

15   invention.

16

17   The printer driver information of the downloaded

18   printer driver 167 is needed in order to install the

19   downloaded printer driver 167 locally to the wireless

20   device 110. The printer driver information typically

21   includes multiple files that are required for use of the

22   printer driver 167, including a file with the main entry

23   point that is supported by the printer driver 167, the name

24   of the printer driver, the version of the operating system

18

1 for use with the printer driver, and other specific

2 information about the printer driver 167.

3   Typically, the spooling device 187 is a server with a

4 standard spooler/scheduler that receives print jobs from

5 other computers and generates printer files that are

6 transmitted to one of the printing devices 120 that can

7 appropriately handle the print job. Therefore, the

8 spooler/scheduler provides the printing capability by the

9 mobile device 110 to the available printers 120. The

10 processor 146 in the spooling device 187 can execute the

11 standard spooler/scheduler and other software or firmware

12 in the spooler device 187.

13   The spooling device 187 also typically downloads the

14 printer driver information and the printer driver 167 to

15 the wireless device 110. The wireless device 110 then

16 creates a printer object 190 after the downloaded driver

17 167 has been initialized, and the selected printer 120 will

18 then be available for printing. The local printer object

19 190 uses (and represents) the physical printer device 120.

20 The local printer object 190 is data with various settings

21 that describe the physical printer device 120. In other

22 words, the data associated with the initialization of the

23 printer driver 167 is stored into the local printer object

24 190.

1   Various known print installation methods (e.g., point

2   and print) may be supported by the spooling device 187 for

3   vending out the drivers 167, after the mobile user 105 has

4   selected an available printer 120 for printing.

5

6   Various examples are available on how a mobile user

7   105 can select an available printer 120 for printing. For

8   example, the mobile user 105 can select an available

9   printer 120 based upon any description that is provided in

10 the print web page for the available printers 120. As

11 another example, the mobile user 105 can select a

12 convenient printer 120 (e.g., a printer that is physically

13 in the proximity of the mobile user 105). The mobile user

14 105 will select a printer name in the list of available

15 printers 120, as indicated in the print page.

16

17 As another example, assume that a mobile user 105 has

18 connected to the wireless network 115 and has loaded a

19 device discovery software that is attempting to discover

20 available printers 120 in the secure wired network 125. In

21 this embodiment, the utility application 150 in the

22 wireless device 110 is a network printer application 150

23 instead of a browser 150, where the network printer

24 application 150 will discover printer devices. Of course,

1   the wireless device 110 could include both a browser and a

2   network printer application for discovering the printer

3   devices. A suitable device discovery software 150 is

4   available from, for example, HEWLETT-PACKARD COMPANY.

5   Device discovery can be performed by sending out a

6   broadcast request or multicast request on a network. The

7   print spooler device 187 can reply back with a list of

8   printers 120 that are available to the mobile user 105.

9   The device discovery software 150 can also set up print

10 paths to the available printers 120.

11

12   It should be appreciated that, in alternative

13 embodiments, the network system 100 may include components

14 and products other than those discussed above. Moreover,

15 the network system 100 can be implemented on different

16 hardware. Printers having printing capabilities different

17 from the disclosed physical printer devices may be used.

18 Those skilled in the art will recognize that other

19 alternative hardware and software environments may be used

20 without departing from the scope of embodiments of the

21 invention. As such, the exemplary environment in Figure 1

22 is not intended to limit embodiments of the invention.

23

1   Figure 2 is a flowchart of a method 200 for a visitor

2   safe wireless printer access point, in accordance with an

3   embodiment of the invention. A mobile user 105 will first

4   connect (205) a wireless computing device 110 to a wireless

5   network (e.g., wireless PRINT network) 115, in order to

6   access and print to a printer 120. The PRINT network 115

7   uses PRINT as the SSID (service set identifier) setting and

8   may or may not use encryption. PRINT is an example of

9   publicly available settings that are necessary for

10   communication on the wireless PRINT network. The PRINT

11   network is intended as a public access point to print

12   spooling device(s). As mentioned above, it is within the

13   scope of embodiments of the invention that the public

14   wireless network 115 may be implemented by use of other

15   suitable types of networking technologies and is not

16   limited to the wireless PRINT network.

17   In step (210), the mobile user will start a type of

18   utility application 150, such as a browser or a network

19   printer application that will discover print devices 120.

20   The browser would be redirected to the spooling device 187

21   and the network printer application would discover the

22   available printers through the spooling device. The

23   spooling device acts as a firewall or bridge that connects

1 the wireless network 115 to the secure wired network 125 to

2 send print jobs to printers.

3   In step (215), the mobile user selects the printer

4 that he/she wishes to print to and the spooling device or

5 network printer application software establishes a print

6 path through the spooling device to the secure wired

7 network printer 120. This is generally done by using

8 printer sharing technology that is available on spooling

9 devices such as, for example, a print spooling appliance

10 available from HEWLETT-PACKARD COMPANY or other suitable

11 spooling devices.

12   In step (220), the mobile user prints to the newly

13 established printer.

14   In step (225), the print job is sent via the wireless

15 PRINT network to the spooling device.

16   In step (230), the print job is spooled on the

17 spooling device and then sent to the printer via the secure

18 wired network 125.

19   In step (235), as an option, the print job status is

20 relayed from the printer, via the secure wired network, to

21 the spooling device and then from the spooling device, via

22 the wireless PRINT network, to the wireless device.

23

1   Thus, an embodiment of the invention simplifies the

2   task of permitting a printer (or printers) to be publicly

3   available to users of wireless devices, in a secure network

4   environment. An embodiment of the invention, when

5   connected to a wired or wireless network, would give the

6   mobile users the ability to connect to a network and easily

7   perform printing, while disallowing access by the mobile

8   users to the secure resources of the network. In addition,

9   an embodiment of the invention provides a service to the

10   mobile users that presents them a list of the available

11   printers upon connection to the wireless network, and then

12   configures the mobile wireless device to print to the

13   available printer that is selected by the mobile wireless

14   device user.

15

16   The various engines, tools, or modules discussed

17   herein may be, for example, software, firmware, commands,

18   data files, programs, code, instructions, or the like, and

19   may also include suitable mechanisms.

20

21   Reference throughout this specification to "one

22   embodiment", "an embodiment", or "a specific embodiment"

23   means that a particular feature, structure, or

24   characteristic described in connection with the embodiment

1 is included in at least one embodiment of the present

2 invention. Thus, the appearances of the phrases "in one

3 embodiment", "in an embodiment", or "in a specific

4 embodiment" in various places throughout this specification

5 are not necessarily all referring to the same embodiment.

6 Furthermore, the particular features, structures, or

7 characteristics may be combined in any suitable manner in

8 one or more embodiments.

9

10   Other variations and modifications of the above-

11 described embodiments and methods are possible in light of

12 the foregoing disclosure. Further, at least some of the

13 components of an embodiment of the invention may be

14 implemented by using a programmed general purpose digital

15 computer, by using application specific integrated

16 circuits, programmable logic devices, or field programmable

17 gate arrays, or by using a network of interconnected

18 components and circuits. Connections may be wired,

19 wireless, by modem, and the like.

20

21   It will also be appreciated that one or more of the

22 elements depicted in the drawings/figures can also be

23 implemented in a more separated or integrated manner, or

1 even removed or rendered as inoperable in certain cases, as

2 is useful in accordance with a particular application.

3

4   It is also within the scope of an embodiment of the

5 present invention to implement a program or code that can

6 be stored in a machine-readable medium to permit a computer

7 to perform any of the methods described above.

8

9   Additionally, the signal arrows in the

10 drawings/Figures are considered as exemplary and are not

11 limiting, unless otherwise specifically noted.

12 Furthermore, the term "or" as used in this disclosure is

13 generally intended to mean "and/or" unless otherwise

14 indicated. Combinations of components or steps will also

15 be considered as being noted, where terminology is foreseen

16 as rendering the ability to separate or combine is unclear.

17

18   As used in the description herein and throughout the

19 claims that follow, "a", "an", and "the" includes plural

20 references unless the context clearly dictates otherwise.

21 Also, as used in the description herein and throughout the

22 claims that follow, the meaning of "in" includes "in" and

23 "on" unless the context clearly dictates otherwise.

24

1   It is also noted that the various functions,

2 variables, or other parameters shown in the drawings and

3 discussed in the text have been given particular names for

4 purposes of identification. However, the function names,

5 variable names, or other parameter names are only provided

6 as some possible examples to identify the functions,

7 variables, or other parameters. Other function names,

8 variable names, or parameter names may be used to identify

9 the functions, variables, or parameters shown in the

10 drawings and discussed in the text.

11

12   While the present invention has been described herein

13 with reference to particular embodiments thereof, a

14 latitude of modification, various changes and substitutions

15 are intended in the foregoing disclosures, and it will be

16 appreciated that in some instances some features of the

17 invention will be employed without a corresponding use of

18 other features without departing from the scope and spirit

19 of the invention as set forth. Therefore, many

20 modifications may be made to adapt a particular situation

21 or material to the essential scope and spirit of the

22 present invention. It is intended that the invention not

23 be limited to the particular embodiment disclosed as the

24 best mode contemplated for carrying out this invention, but

1   that the invention will include all embodiments and

2   equivalents falling within the scope of the appended

3   claims.